



**National
Transportation
Safety Board**

Sleep Deprivation, Shift Work, Jet Lag and Performance Decrement: Safety Challenges

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Board Member**

**North Puget Sound Center for Sleep Disorders
November 2, 2012**



- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**



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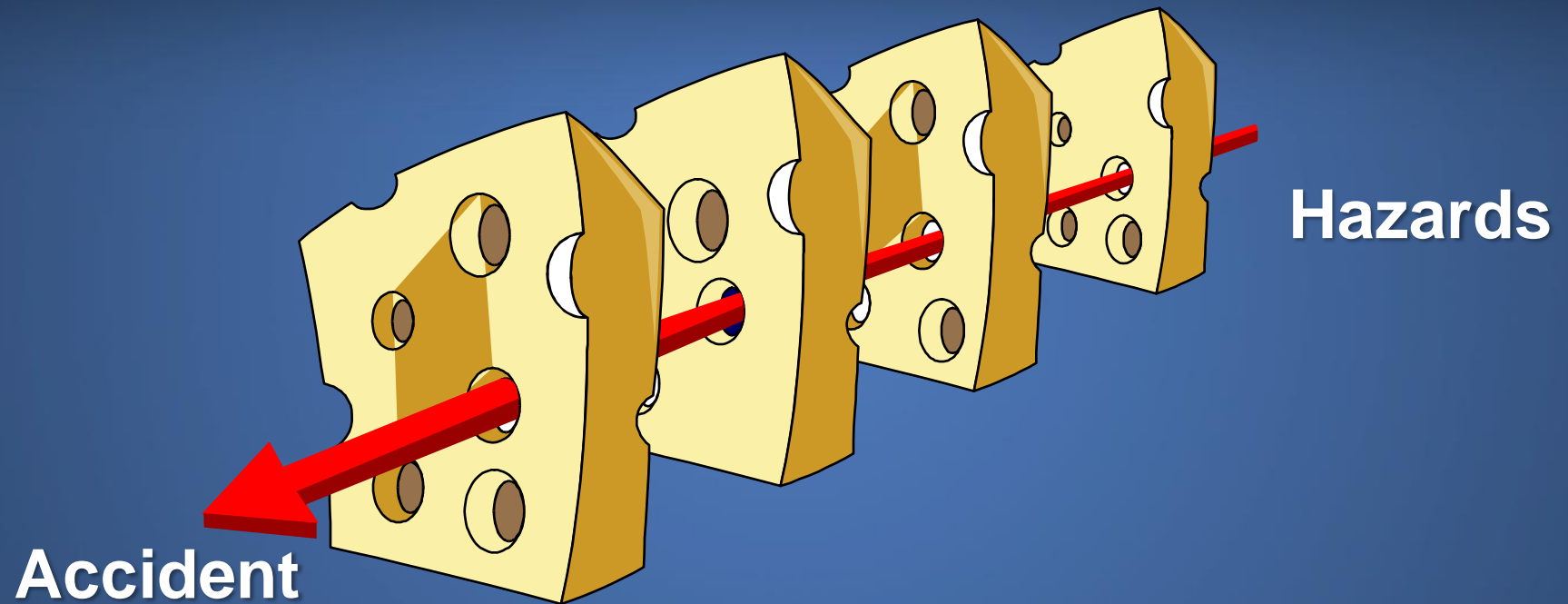


All Modes



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“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



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**#1: Sleep deprivation, shift work,
jet lag and performance decrement
are safety risks.**



Go! Flight 1002



- early starts, multiple segment days, sleep apnea



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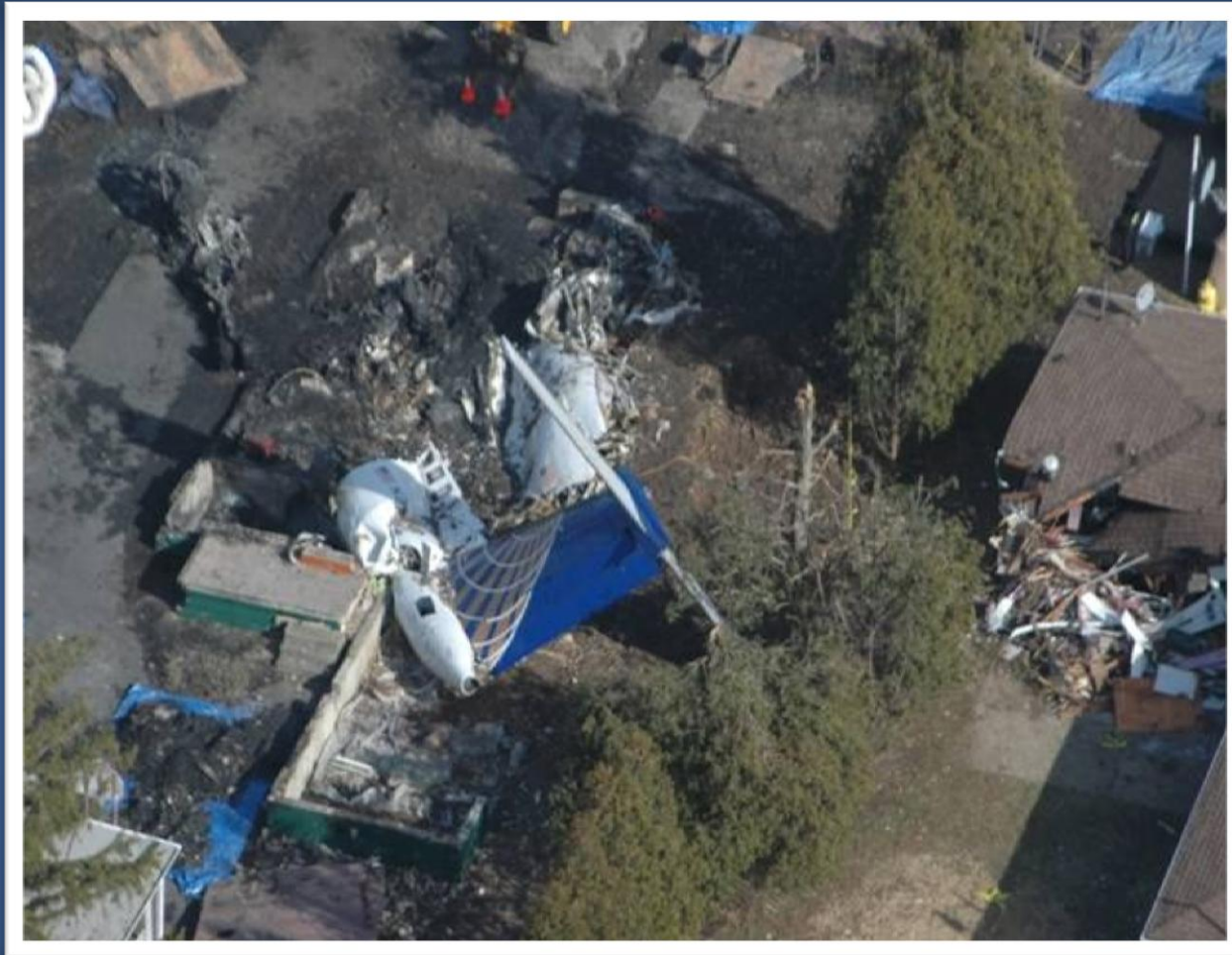
Honorable John K. Lauber:

No Accident \neq
Safe Operation



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Continental Connection (Colgan Air) Buffalo, NY (February 12, 2009)



- 50 fatalities; commuting, acute sleep loss



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Fatal Airline Accidents (Examples) (fatigue cited)

- 8/97 Guam: 228 fatalities
- 6/99 Little Rock AK: 11 fatal
- 10/04 Kirksville MO: 11 fatalities
- 8/06 Lexington KY: 49 fatalities
- 7/08 Owatonna MN: 8 fatalities
- 2/09 Buffalo NY: 49 fatalities



Miami, OK (June 26, 2009)

10 fatalities
3 serious injuries
2 minor injuries
5 no injuries



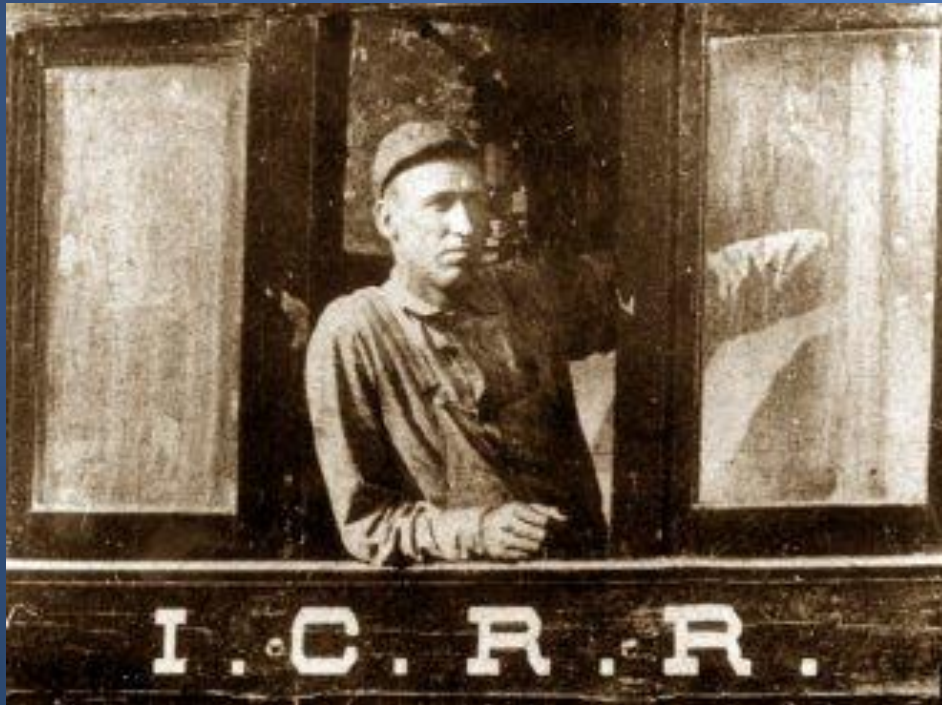
Probable Cause (fatigue)

“ . . . driver’s fatigue, caused by the combined effects of acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea, which resulted in the driver’s failure to react to slowing and stopped traffic ahead by applying the brakes or performing any evasive maneuver to avoid colliding with the traffic queue. . . . ”



Casey Jones: Famous Railroad Engineer

Fatal accident on April 30, 1900 at 3:52 AM



"Engineer on No.1 failed to answer flagman who was out proper distance. It is supposed did not see the flag."

'impossible to believe that an engineer of Jones's experience would have ignored a flagman and fuses (flares) and torpedoes exploded on the rail to alert him to danger.'



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Track Path Animation

Collision Between Two BNSF Railway Freight Trains

Red Oak, Iowa

April 17, 2011

DCA11FR002



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Probable Cause (fatigue)

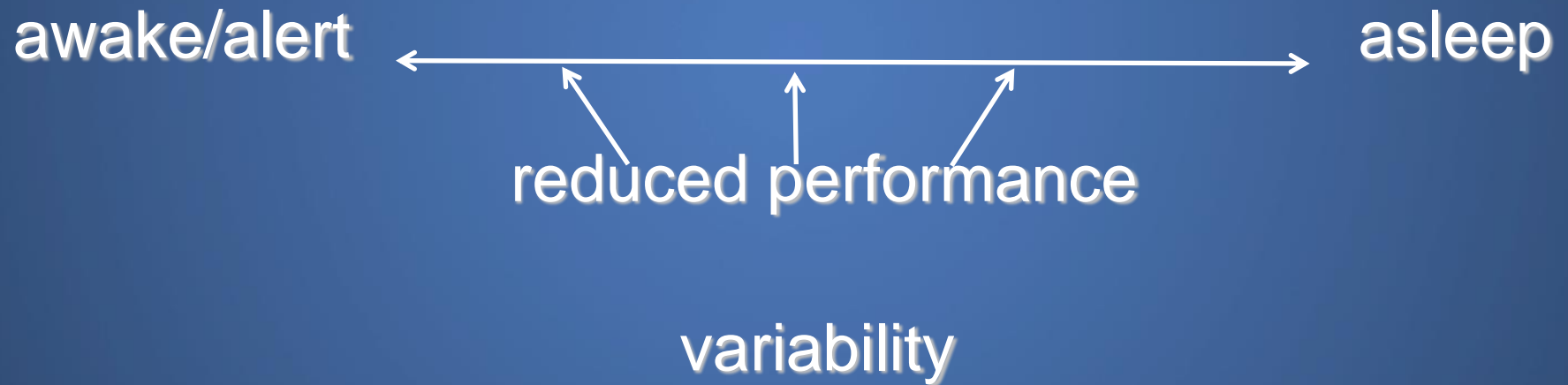
“ . . . failure of the crew of the striking train to comply with the signal indication requiring them to operate in accordance with restricted speed requirements and stop short of the standing train because they had fallen asleep due to fatigue resulting from their irregular work schedules and their medical conditions.”



#2: Factors that create fatigue safety risks.



Fatigue Risks



Fatigue Risks

- degraded 20 – 50%+:

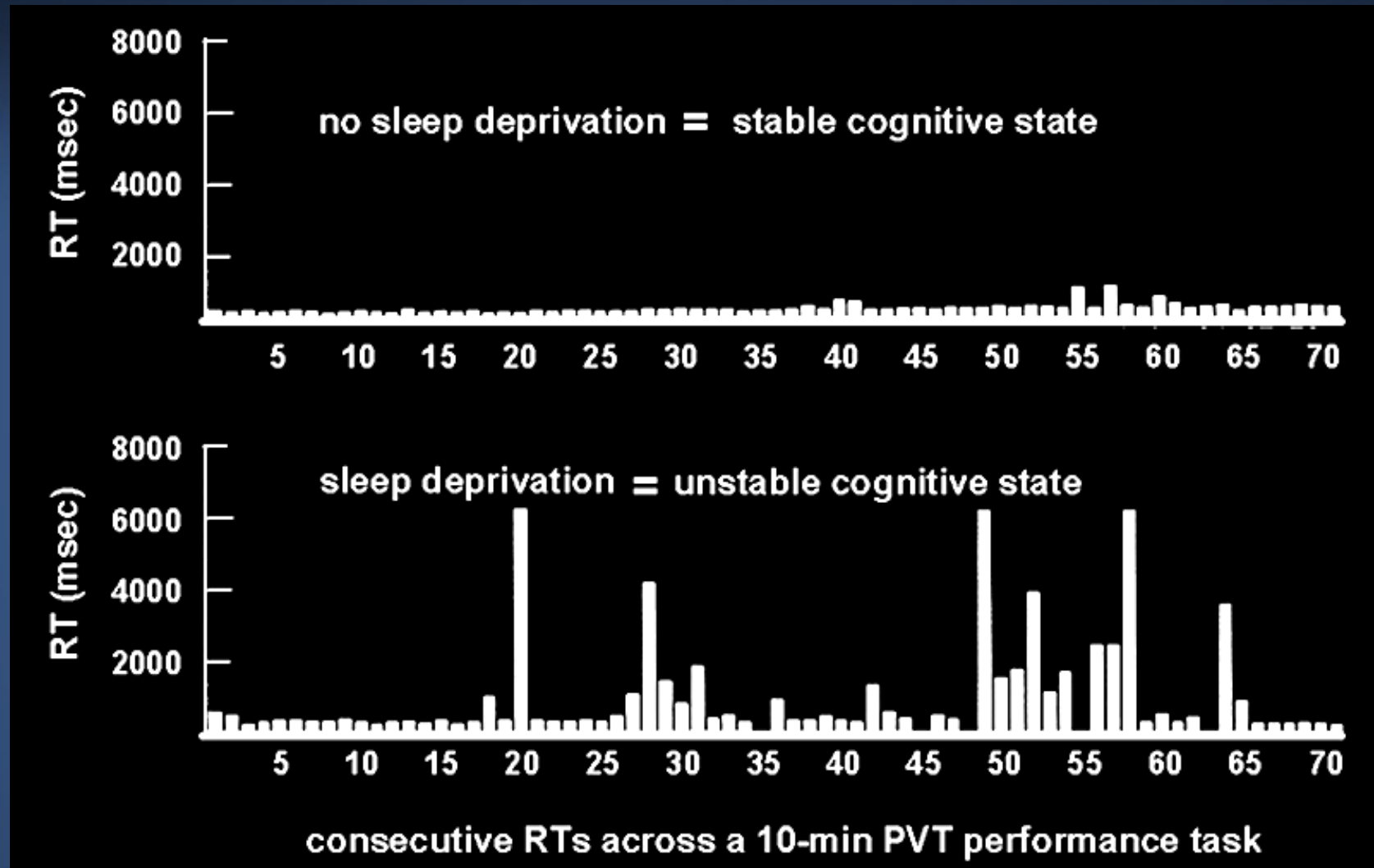
- reaction time
- judgment
- memory
- attention
- communication
- mood
- situational awareness

- increased:

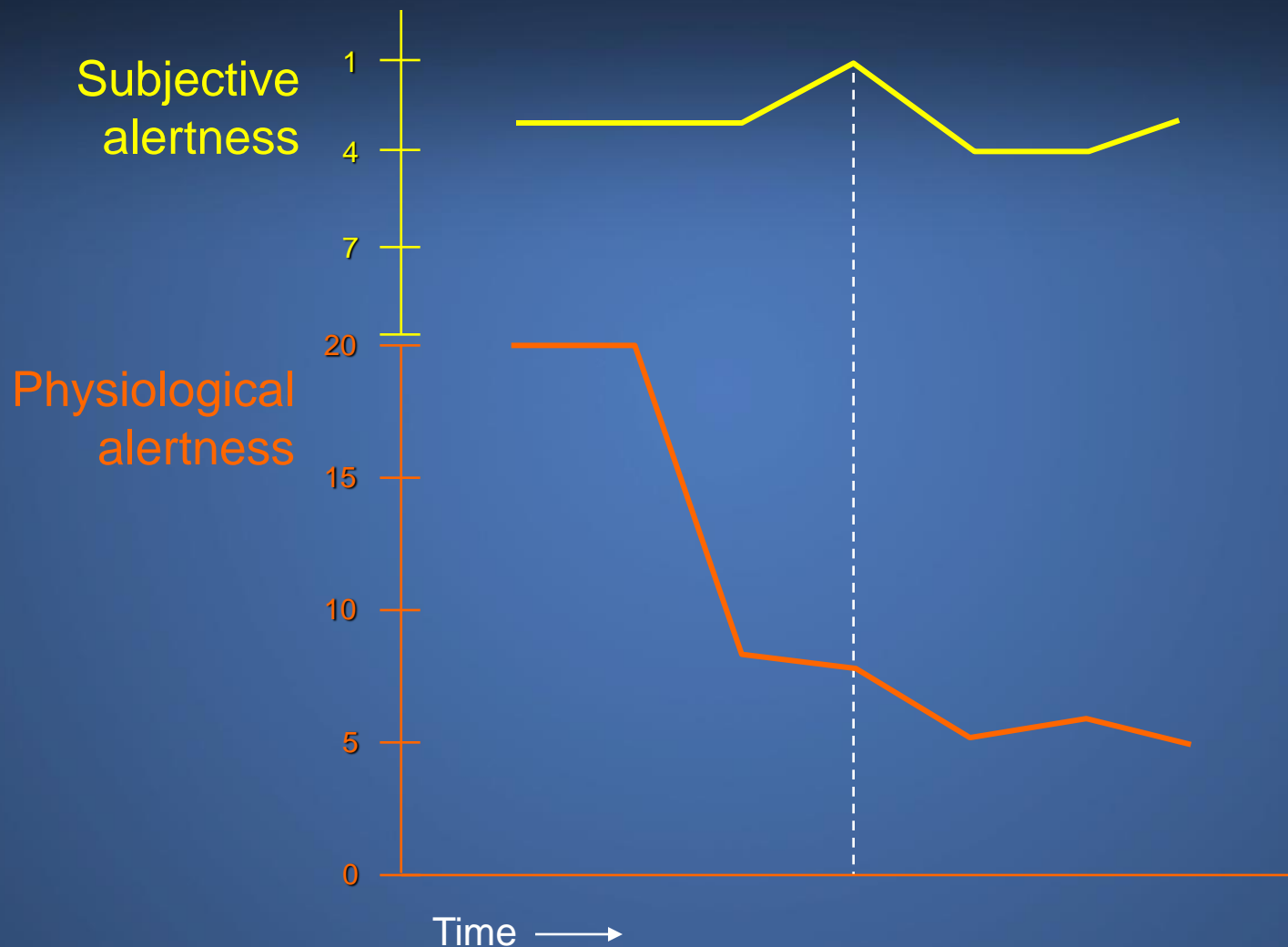
- irritability
- attentional lapses
- apathy
- microsleeps



Fatigue and Reaction Times



Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986



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#3: NTSB recommendations address fatigue.



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MOST WANTED LIST

A program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. The following are ten of the current issues.



Addressing Human
Fatigue



General Aviation
Safety



Safety Management
Systems



Runway Safety



Bus Occupant Safety



Pilot & Air Traffic
Controller
Professionalism



Recorders



Teen Driver Safety



Addressing Alcohol-
Impaired Driving



Motorcycle Safety



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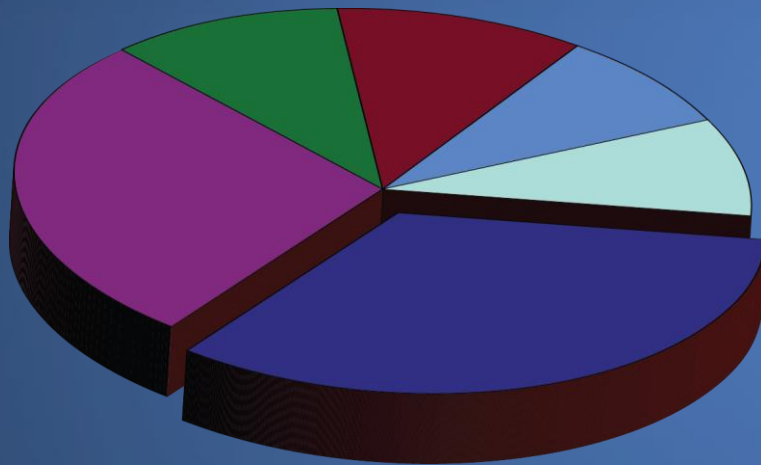
NTSB Safety Recommendations: Fatigue

- MOST WANTED since 1990
- ~200 fatigue recommendations



Complex Issue:

Requires Multiple Solutions



- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation



NTSB Fatigue Recommendations: Education/Strategies

- Develop a fatigue education and countermeasures training program
- Educate operators and schedulers
- Include information on use of strategies: naps, caffeine, etc.
- Review and update materials



Scheduling Policies and Practices

Victoria, Texas, January 2, 2008



Victoria, Texas Fire Department

- Day sleep, night drive, ~ 4 am WOCL



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NTSB Fatigue Recommendations: Hours of Service / Scheduling

- Science-based hours of service
- Allow for at least 8 hours of uninterrupted sleep
- Fatigue mitigation strategies in the hours-of-service regulations for passenger-carrying drivers who operate during the nighttime window of circadian low
- Reduce schedule irregularity and unpredictability



Sleep Apnea

Mexican Hat, UT, January 6, 2008



- 360 rollover, 50/53 ejected, 9 fatalities, OSA (-CPAP)



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NTSB Fatigue Recommendations: Sleep Apnea/Health Related

- Develop standard medical exam to screen for sleep disorders; require its use
- Educate companies and individuals about sleep disorder detection and treatment, and the sedating effects of certain drugs
- Ensure drivers with apnea are effectively treated before granting unrestricted medical certification



Owatonna, MN (July 31, 2008)



8 fatalities



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Owatonna, MN (July 31, 2008): Safety Recommendations

7. Revise regulations and policies to permit appropriate use of prescription sleep medications by pilots under medical supervision for insomnia.
9. Review the policy standards for all common sleep-related conditions, including insomnia, and revise them in accordance with current scientific evidence to establish standards under which pilots can be effectively treated for common sleep disorders while retaining their medical certification.





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Animation of Accident Reconstruction

Motorcoach Run Off Road-Collision with Bridge Signpost

Interstate Highway 95 Southbound

New York, New York

March 12, 2011

HWY11MH005

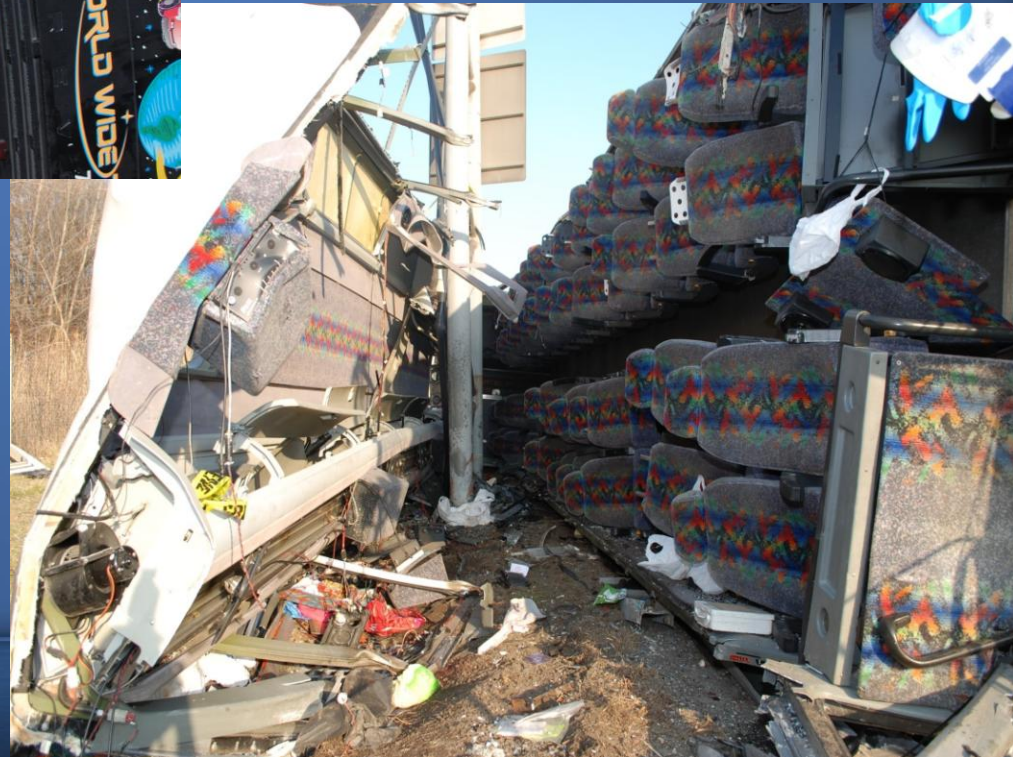


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'Bronx Bus', New York, NY (March 12, 2011)



15 fatalities
17 injuries



Probable Cause

“The National Transportation Safety Board determines that the probable cause of the accident was the motorcoach driver's failure to control the motorcoach due to fatigue resulting from failure to obtain adequate sleep, poor sleep quality, and the time of day at which the accident occurred.”



Manage Fatigue = Enhance Safety

- Promote culture change
- Educate everyone
- Acknowledge risks
- Take action!



Good sleep, safe travels.



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